Citation:

Savage JS, Mitchell DC, Smiciklas-Wright H, Symons Downs D, Birch LL. Plausible reports of energy intake may predict body mass index in pre-adolescent girls. *J Am Diet Assoc.* 2008; 108 (1): 131-135.

PubMed ID: 18155999

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the extent to which girls' reported energy intake assessed at age nine years predicted girls' body mass index (BMI) at age 11 years, before and after adjusting for pubertal status and parental BMI.

Inclusion Criteria:

- Study participants were part of a larger longitudinal study designed to examine parental influences on girls' growth and development
- Only data for girls age nine years (N=183) and 11 years (N=177) and their parents (mothers, N=182; fathers, N=169) who were assessed when girls were age nine and 11 were included in this sample
- Absence of dietary restrictions, severe food allergies or chronic medical problems affecting food intake.

Exclusion Criteria:

None stated.

Description of Study Protocol:

Recruitment

Participants were part of a larger longitudinal study designed to examine parental influences on girls' growth and development.

Design

Prospective cohort study.

Dietary Intake/Dietary Assessment Methodology

- Girls' energy intake at age nine was assessed from three 24-hour recall interviews conducted by the Dietary Assessment Center at the Pennsylvania State University using the computer-assisted Nutrition Data System for Research (NDS-R)
- Girls provided three 24-hour recalls within a two to three-week period, including two randomly selected weekdays and one weekend day
- Girls reported food intake; mothers were present to provide information about recipes and improve accuracy. Posters depicting food portions were used as visual aids
- Reported energy intake was calculated by taking the mean of three days of dietary recall data.

Blinding Used

None.

Intervention

Not applicable.

Statistical Analysis

- To examine reporting accuracy, girls were categorized as implausible under-reporters, plausible reporters or implausible over-reporters at age nine. Analysis of variance was used to assess differences among under-, plausible and over-reporters on measures of reported energy intake and weight status
- A series of independent regression analyses were conducted to examine the contribution of reported energy intake at age nine for predicting BMI at age 11 for the total sample, (N=169); for plausible reporters, (N=102); and for implausible reporters, (N=67) (Model 1)
- Hierarchical regression analyses were conducted, adjusting models for parental BMI (Model 2) and for girls' pubertal status at age nine (Model 3). All analyses were conduced using SAS software (version 8.02, 2001, SAS institute, Cary NC).

Data Collection Summary:

Timing of Measurements

Unclear.

Dependent Variables

- Reported energy intake by three 24-hour recalls
- BMI.

Independent Variables

Group:

- Implausible under-reporters
- Plausible reporters
- Implausible over-reporters at age nine.

Control Variables

- Parental BMI
- Girls' pubertal status at age nine.

Description of Actual Data Sample:

- *Initial N:* 183 (100% female)
- *Attrition (final N):* 177
- *Age:* Nine to 11 years
- *Ethnicity:* Non-Hispanic white
- *Other relevant demographics:*
  - Girls' pubertal status
  - Maternal BMI and parental BMI were not different between implausible under-reporters, plausible reporters and implausible over-reporters
- *Anthropometrics:* BMI at age nine was not different between groups
- *Location:* Pennsylvania State University.

Summary of Results:

- Under-reporters had significantly higher BMI, BMI Z score and BMI percentile, and reported significantly lower energy intakes in comparison to both plausible and over-reporters
- No group differences were noted for pubertal status, maternal BMI or paternal BMI
- When participants were grouped by weight status, a similar proportion of the total sample (31%) and subgroup of plausible reporters (27%) were classified as overweight (BMI higher than the 85th percentile) based on age- and sex-specific growth charts; in contrast, nearly two thirds of implausible reporters were overweight.

Mean Baseline and Outcome Characteristics of Girls and their Parents for their Parents for the Total Sample and Mean Comparisons by Reporting Accuracy Sub-groups Using a Procedure that Identifies Plausible and Implausible Under-reporters and Over-reporters

	Total Sample (N=183)	Implausible Under-reporters (N=30, 16.4%)	Plausible Reporters (N=107, 54.8%)	Implausible Over-reporters (N=46, 25.1%)
Predictors (age nine)				
Girl reported energy intake (kcal per day)	1,823.6±344.9	1,394.6^{X}±190	1,763.1^{Y}±208	2,224.9^{Z}±244
Dependent variables (age 11)				
Girl BMI (kg/m^2) Normal weight	20.0±4.0 17.9±1.8 24.9±3.7	21.5^{X}±4.1	19.4^{Y}±3.9	18.5^{Z}±3.0

Overweight				

x, y, z: Superscripts indicate significant group differences (P<0.05); analysis of variance was used to test group differences.

- In Model 1, reported energy intake was not a significant independent predictor of BMI in the total sample or among the sub-group of implausible reporters; however, among plausible reporters, reported energy intake was a significant predictor, explaining 14% of the variance for BMI at age 11
- In Model 2, adjusting for maternal and paternal BMI explained 27% and 32% of the variance in girls' BMI among the total and subgroup of implausible reporters, respectively. No additional variance was explained when reported energy intake was added to the model. Among plausible reporters, parental BMI explained 23% of the variance in girls' BMI at age 11. However, when reported energy intake was added to the model, reported energy intake explained an additional 9% of the variance, over and above the variance explained by parental BMI
- In Model 3, among the total sample and subgroup of implausible reporters, no additional variance was explained by reported energy intake after adjusting for parent BMI and girls' pubertal status. In contrast, among the subgroup of plausible reporters, after adjusting for parent BMI and girls' pubertal status, reported energy intake explained an additional 4% of the variance. Model 3 accounted for a total of 46% of the variance in BMI in girls with a plausible reported energy intake. In this case, even after adjusting for two well established predictors of girls' weight status, the addition of reported energy intake resulted in a small, but significant increase in R^2.

Author Conclusion:

Results from this study do not support the view that obese and overweight children and adolescents consume significantly fewer calories than normal weight children, and provide evidence that under-reporting is common and that the magnitude of under-reporting tends to increase as weight status increases.

Reviewer Comments:

The author's noted the following limitations:

- *The sample was racially and demographically homogenous and included only girls, which prevents the generalization of study findings to boys or to other racial and socioeconomic groups*
- *The sample was relatively highly educated and thereby may be more aware of their nutrient intake and have different energy intakes than the general population*
- *The procedure used to identify implausible reporters may be identifying girls who are actually under-eating rather than under-reporting.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	No
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	No
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	No
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	No
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	No
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	No
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	Yes
6.6.	Were extra or unplanned treatments described?	Yes
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	Yes
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes